

## **ABSTRACT**

Methods and apparatus are provided for factorized processing of a set of GNSS signal data derived from signals having at least three carriers. A geometry filter is applied to the set of GNSS  
5 signal data using a geometry carrier-phase combination to obtain an array of ambiguity estimates for the geometry carrier-phase combination and associated statistical information. A bank of ionosphere filters is applied to the set of GNSS signal data using a geometry-free ionosphere carrier-phase combination to obtain an array of ambiguity estimates for the ionosphere carrier-phase combination and associated statistical information. At least one bank of Quintessence filters  
10 is applied to the set of GNSS signal data using a geometry-free and ionosphere-free carrier-phase combination to obtain an array of ambiguity estimates for the geometry-free and ionosphere-free carrier-phase combination and associated statistical information. At least one code filter is applied to the set of GNSS signal data using a plurality of geometry-free and ionosphere-free code-carrier combinations to obtain an array of ambiguity estimates for the code-carrier combinations and  
15 associated statistical information. The resulting arrays are combined to obtain a combined array of ambiguity estimates for all carrier phase observations and associated statistical information.